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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/305,240	05/04/1999	BYUNG-SUP SHIM	5484-48	1838

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MARGER JOHNSON & MCCOLLOM P C
1030 S W MORRISON STREET
PORTLAND, OR 97205

EXAMINER

NADAV, ORI

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 07/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/305,240

Applicant(s)

SHIM ET AL.

Examiner

ori nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9 is/are pending in the application.
- 4a) Of the above claim(s) 1-4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-7 and 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Request for Continued Examination

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/20/2002 has been entered. An action on the RCE follows.
2. The amendment filed on 05/20/2002 has been entered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian et al. (5,668,021) in view of Applicant Admitted Prior Art (AAPA). Subramanian et al. teach in figure 7 and related text a transistor comprising: a semiconductor substrate 10 of a first conductive-type; source and drain regions 28, 30,

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34. 36 of a second conductive type formed in the substrate and defining between them a channel region, an impurity implantation region 24 of impurities of a second conductive type (column 3, lines 56-58) formed in a first sector of the channel region, the first sector (i.e. the region where the impurity implantation region 24 is located) not reaching either one of the source region and the drain region 28, 30, 34. 36, the impurity implantation region of the first sector comprising a surface region operable under field effect, a second sector of the channel region exclusive of the first sector comprising a uniform doping concentration of the first conductive type and a surface region operable under field effect, a gate insulating layer 12 on the substrate over at least a portion of the surface region of the first sector and the surface region of the second sector, and a gate 46 (14, 26 and 38, see column 5, lines 57-60) on the gate insulating layer over at least a portion of the first sector and over at least a portion of the second sector.

Although Subramanian et al. do not state that the second sector of the channel region comprises a uniform doping concentration, the embodiment of figure 7 does not recite any additional channel doping in the second sector (the second sector is a region in the channel region which is exclusive of the first sector) and no special substrate doping. Note that the second sector of the channel region is part of the substrate. Thus, the doping concentration of the substrate 10 is uniform, as claimed.

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Subramanian et al. do not teach using the transistor as a pull up transistor, wherein one of the source and drain regions being electrically coupled to an I/O pad and the other one being electrically coupled to a Vdd terminal, and does not state that the impurity implantation region of the first sector is operable as a depletion channel, and the second sector of the channel region is operable as an enhancement channel.

AAPA teaches in figure 1 and related text (page 2, lines 1-15) a pull up transistor B, wherein one of the source and drain regions being electrically coupled to an I/O pad 20 and the other one being electrically coupled to a Vdd terminal.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Subramanian et al.'s transistor as a pull up transistor, wherein one of the source and drain regions being electrically coupled to an I/O pad and the other one being electrically coupled to a Vdd terminal, as taught by AAPA, in order to use the device in an application which requires a pull up transistor. Note that in order to operate a pull up transistor one of the source and drain regions must be electrically coupled to an I/O pad and the other one must electrically coupled to a Vdd terminal. The combination is motivated by the teachings of AAPA who point out the need for an improved pull up transistor.

Furthermore, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure

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is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). In this case, Subramanian's transistor is capable of performing as a pull up transistor.

Regarding the claimed limitations of an impurity implantation region of the first sector being operable under field effect as a depletion channel, and the second sector of the channel region being operable under field effect as an enhancement channel, although Subramanian et al. and AAPA do not state that the impurity implantation region of the first sector is operable under field effect as a depletion channel, and the second sector of the channel region is operable under field effect as an enhancement channel, these features are inherent in Subramanian et al. and AAPA's device for the following reasons. The first sector comprises first conductive type dopants and the second sector comprises second conductive type dopants. The equivalent circuit for Subramanian et al. and AAPA's transistor is identical to the equivalent circuit for applicant's transistor depicted in applicant's figure 7c. The equivalent circuit comprises three transistors operating at two different modes, a first sector operates at an n-channel (Subramanian et al., column 3, lines 59-61) as a depletion transistor, and a second sector operates at a p-channel as an enhancement transistor. Therefore, while operating the transistor as a pull up transistor, the impurity implantation region of the first sector of Subramanian et al. and AAPA's transistor is operable under field effect as a depletion channel (due to the first conductive type dopants), and the second

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sector of the channel region is operable under field effect as an enhancement channel (due to the second conductive type dopants), as claimed.

In the alternative, regarding the claimed limitations of an impurity implantation region of the first sector being operable under field effect as a depletion channel, and the second sector of the channel region being operable under field effect as an enhancement channel, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959).

"Apparatus claims cover what a device is, not what a device does ." (emphasis in original) Hewlett - Packard Co . v. Bausch & Lomb Inc ., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). In this case, the claimed structure is not distinct from prior art's structure, because Subramanian et al. and AAPA's transistor is identical to applicant's transistor.

Regarding claim 6, Subramanian et al. teach in figure 7 and related text a first sector 24 having a narrower line width than a line width of the gate 46 (14, 26 and 38, see column 5, lines 57-60).

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Regarding claim 7, Subramanian et al. teach in figure 7 and related text a gate 46 (14, 26 and 38, see column 5, lines 57-60) comprises a first portion over the first sector and a second portion over the second sector; and the first portion is in a predetermined ratio with respect to the second portion.

Regarding claim 9, Subramanian et al. teach in figure 7 and related text a first sector separated from the source region and from the drain region by substantially equal distances (column 2, lines 45-47).

Response to Arguments

5. Applicant argues on page 4 that Subramanian et al. do not mention a pull up transistor and do not teach difficulties with or need to improve pull up transistors.

Applicant cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Subramanian et al. teach substantially the entire claimed structure, as recited in claim 6, except using the device as a pull up transistor. AAPA teaches a pull up transistor, wherein one of the source and drain regions being

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electrically coupled to an I/O pad and the other one being electrically coupled to a Vdd terminal. AAPA further teaches the need for an improved pull up transistor.

6. Applicant argues on pages 3 and 4 that Subramanian et al. teach a buried junction 24 spaced away from the surface of the substrate and having a peak concentration below the surface of the substrate.

Figure 7 of Subramanian et al. depicts the top of region 24 being in direct contact with the surface of the substrate. Therefore, "buried junction 24" is not spaced away from the surface of the substrate as argued by applicant. Furthermore, forming the peak concentration of region 24 spaced away from the surface of the substrate still renders the claimed invention obvious over Subramanian et al. and AAPA, because this feature is not recited in the rejected claims.

7. Applicant argues on pages 3 and 4 that Subramanian et al. teach a non uniform doping profile in column 1, line 67 to column 2, line 1, whereas claim 5 recites a second sector of the channel region comprising a uniform doping concentration of the first conductive type.

Subramanian et al. do not teach in the embodiment of figure 7 or anywhere in the disclosure a second sector of the channel region comprising a non uniform doping concentration of the first conductive type. The second sector is the portion of the

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substrate in the channel region which is exclusive of the first sector, and Subramanian et al. do not teach a non uniform doping profile in the substrate. Furthermore, the non uniform doping profile mentioned by Subramanian et al. in the section "related application" (column 1, line 67 to column 2, line 1) refers to forming a channel region having first and second sectors, thus producing a channel region of a non uniform doping profile. Subramanian et al. do not refer in this section to a second sector of the channel region having a non uniform doping profile, as argued by applicant.

8. Applicant argues on page 5 that the examiner's conclusion of obviousness is based upon improper hindsight reasoning.

It must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case AAPA provides the motivation for the combination by pointing out the need for an improved pull up transistor.

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Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(703) 308-8138**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

A handwritten signature in black ink, appearing to read 'Ori Nadav', with a stylized flourish at the end.

Ori Nadav

July 3, 2002